

T H E

F A R M E R's

NEW-YEARS GIFT

To his COUNTRYMEN, HERITORS, and
FARMERS, for the Year 1757.

*By Sir Arch. Grant Barch
of Monymusk*

Pater ipse colendi	
Haud facilem esse viam voluit, primusque per artem	
Movit agros, curis acuens mortalia corda;	
Nec torpere gravi passus sua regna veterno.	VIRG. Georg. l. i.
Ut varias usus meditando extunderat artes	
Paulatim,	Id.
Labor omnia vincit	
Improbos, et duris urgens in rebus egestas.	
Prima Ceres ferro mortales vertere terram	
Instituit:	Id.
Rursus in obliquum verso perrumpit aratro,	
Exercetque frequens tellurem, atque imperat arvis.	Id.
Heu, magnum alterius frustra spectabis acervum;	
Concussaue famen in sylvis solabere quercu.	Id.

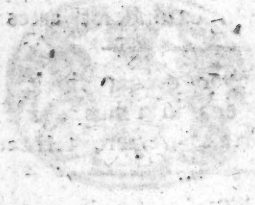
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THE NEW YORK GIFT

For the year 1891



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THE FARMER'S
NEW-YEAR'S GIFT

*To his Countrymen, Heritors and Farmers, for
the Year 1757.*

IN these long nights, and weather which interrupts the operation in the field, I thought, I could not be better employed than to give a few hours, from more personal concerns, to endeavour to rouse my countrymen, to think somewhat more seriously of their own and countries interest; and tho' I should not communicate any thing new or instructing to all, the refreshing their memories in an easy and cheap way, at a time when they have leisure to think and converse, and form their plans for the active season, might be of some use.

Every man of business, should form for himself a set of approved useful maxims adapted to his situation, which should be always in his view, and influence all his conduct; because, human frailties and worldly distractions, obstruct their being otherways so often before him as they ought to be, and they cannot be too frequently under consideration, for at one time or other they will incite to action.

Some of those proper for the farmer, might be such as follow, to which he should add others as they occasionally occur.

Husbandry was the most antient employ, and antiently esteemed the most honourable. All the great ones of antiquity, not only loved but practised it; and certainly it is the most useful employ for the society; and of all occupations affords the practiser the most agreeable variety; therefore, it is honourable and comfortable to study and pursue it.

A learned author justly says, the greatest heroes of antiquity, wielded the share as well as the sword, and the fairest hands did not more disdain to hold a crook than a scepter.

Strict virtue which will affect all parts of conduct, will always be found the best policy, both in respect to comfort and interest; being always esteemed, even by those who do not practise it, and extensive credit to all words and actions, is the certain consequence. Also true morality, will produce industry; and prosperity, will certainly follow strict truth; and punctuality of performance will always have its reward.

In all countries, heritors and tenants are found to be rich in proportion, as good husbandry is known and practised; this holds invariably,

riably, independent of climate, soil or situation ; for each place hath its advantages, and according to circumstances hath its proper husbandry ; therefore, it is of importance for every one to examine by serious thought, and all manner of enquiries, free from all prejudices of the customs, &c. of his own country, if he could not do better. And a frequent consideration of this certain truth, excites, to the proper enquiries and a suitable conduct.

A man even of knowledge in any science or business, improves much by converse on the subject, altho' with persons of much inferior knowledge. — He profits, not only from what may be told or suggested by others, but from what he himself says and thinks upon such occasions ; and therefore, clubs of farmers, would be extremely useful ; and at least in moonlights and long nights would be easy and no expence.

Where farmers are poor, it will be always found upon enquiry whatever their situation be, that they are ignorant or negligent, except in special cases of uncommon calamities.

The learned *Columella* observes justly, in his preface to his excellent book upon husbandry, the groundlessness of very common complaints, of the badness of the soil or climate, or the seasons, or inconveniencies of situation ; whereas the true cause of want of success, is our ignorance or neglects. — And the learned *Pliny* in his natural history says, that the true cause of the former plenty in his country, beyond what they then experienced, was, that the ground was at first cultivated by the hands of generals, consuls, tribunes, and senators : But in his time, by slaves and criminals, who did not cultivate it so carefully as those men of honour and virtue. And the famous and learned *Varro* expresseth the like sentiment.

It is reciprocally the interest of heritor and tenent, to promote each others advantage, and thereby cultivate the proper friendships, which should be betwixt such connections ; therefore oppressive rents or services should not be imposed, nor reasonable ones refused ; and all prudent encouragements should be given and taken for all reasonable improvements.

Tho' bad habits are stubborn, and will not easily yield to reason, perseverance and discretion, will get the better of them ; therefore heritors should not be discouraged, tho' they meet with muleish dispositions, and their labour will be rewarded, by both comfort and increase of fortune.

The riches and strength of any country don't depend upon the numbers of its people, but evidently so upon the people's being industrious. This truth, is too little regarded, in the choice of crofters, grassmen, &c. and employments of the poor. — Therefore, all should concur, to make all industrious ; or procure people that are so. — Even young ones, may be brought to gain their bread at very
early

early years. Numbers of industrious people, improve any country; they are a ready market without carriage, and will always consume in proportion as they gain; and they promote better culture and manure, &c. Any country will be rich in proportion to its industry, even preferable to those countries, which produce the richest mines; gold or silver don't remain in Portugal or Spain; and preferable to these countries of the most luxuriant natural produce witness the poverty and weakness of Asia, &c.

Shelter, would be very beneficial in all northern countries; cold degenerates cattle and all vegetables, and hurts the soil. If shelter is by planting, it also accommodates with fuel and all needful timber, without carriage or purchase. If by inclosing, it also drains and cleans the ground. And much of it might be easily got in the North, by sowing French whins in many places and especially on founds of fold dykes which don't hurt and would also save the expence of time, &c. in the yearly building, be fuel, and is the best winter meat for horses and sheep.

Good tools, are essential in all husbandry; and they are the best, which perform the work most effectually, and with the least charge of time, men or cattle. It is therefore of importance to enquire after such, and how to obtain them the best and cheapest.

All oeconomy of time and goods, is also essential, and in consequence, the most effectual carriages, are equally so; therefore it is every one's material interest, to study this in every article; and amongst other things, to have proper carriages and be at pains and expence for good roads for them. A prudent man, will pay two pence to gain or save three pence; a good road will soon accomplish this, by saving time, additional quantity transported, and preventing damage to his cattle and machines.

A farmer's endeavour to be quickly rich, by unreasonable impatience or greed, is the surest way to be quickly poor, or to remain so; this is as certain as if Solomon had said it; and will pretty generally hold true, amongst all ranks of men.

Proper manure, and plenty of it, useful and easily to be had in all situations; is beneficial for grass and hay as well as tillage land. There are vast varieties of it, besides what cattle, &c. produce; all sorts of marles, water, lime, salt, shells, sea weed, water or sand, ashes from turf, clay, &c. ferns and all vegetables, and redd of ditches, &c. bottoms of stacks of corn or hay, and where floods or rains bring soil. But mixing of soils as hereafter directed, and every one's reason will suggest, is in the power of every one in every situation.

In all sorts of farms or husbandry, a small parcel of land well managed, will yield more profit and pleasure, than double that quantity of the like natural quality, with more superficial management. All

cattle and vegetables should not only live but thrive with the farmer; for which purpose, he must assist and improve his land; and the change of brood and feeds; contributes also to prevent their decline or degenerating in size or quality. Take all from a worse or more stubborn soil if possible, but all seed should be full ripe, the greater the perfection of the seed, the better the produce.

In tillage, that culture which most resembles the garden culture, is both from reason and experience, found to be the best; and good culture, will in some degree in all soils supply the want of manure, besides destroying weeds, which consume manure and destroy the intended crop.

Horses, at least mixed with oxen, move quicker than oxen by themselves; so do more work, of the same quality, in the same time; therefore right choice of cattle and tools, saves expence of time, forage and every thing; and enables to do useful work, and keep other useful cattle by such savings. And plow deep where the under soil is good, and shallow where bad and not proper for mixture.

It is both private and public loss, that the people of the North, so generally eat so much of pure oat meal without mixture; oats are the staple of the northern produce, and the more is consumed, there is the less for sale: the more expence the farmer's family is, there is the less for his increase of fortune, or for the heritor. Rye, bear, and pease, are justly called the poor man's boll; because, besides the great benefit of their straw for houses and horses, they render much more meal than oats, and equal quantities feed further: a mixed bread is wholesomest; and even where clean oat meal is used, there is great saving by being better dried and ground rounder. Much might be saved by these articles, which therefore merit the serious consideration of heritor and tenant; and most of all, the poor labourer hath need to think of them.

A prudent farmer, whatever his situation be, will keep a due proportion betwixt his tillage and pasture land; that is, not to plow more than he can procure plenty of manure to enrich; and he will find it his advantage to exceed rather in having less than more. Without due attention to this, the goodness of soil, climate and other accommodations, tho' extraordinary, and although accompanied with industry and frugality, will not make him rich; and with proper attention to this, tho' with inferior advantages in other respects, he will have more success.

A very learned antient author gives us the following just observation, worthy to be kept always in remembrance, viz. That there are two sources only, from whence men can derive useful rules of conduct, our own experience and that of others; the first is most generally followed, and often the most effectual, but is very dangerous, costly and painful; therefore prudence will prefer the latter, which will enable

enable us to discern at all times, what is most fit and most useful, without equal hazard, expence or disquiet. Happy those who are so wise as to follow the last, but with this caution, not to confine it to the customs of one's own or any particular country, but exert enquiry and reason, for the pattern from which we would learn.

Having thus laid before you some general maxims, to which you can make proper additions, and upon all which, you cannot too often employ your thoughts, especially at such seasons which afford leisure; I shall proceed to give you some extracts from the System of Husbandry lately published, which hath been generally esteemed; with such observes or alterations as presently occur to me, may be useful to you. Many of you have not access to such a book; and such, these extracts, may both entertain and instruct; and such of you, as have access to the book, they bring in short compass and at small expence, some articles to your review and consideration. The only valuable purpose of having or reading books, is to make them useful.

The author's method is good, and when compleatly executed, which a proper appendix may perform, it would indeed make a compleat System of Husbandry, tho' in some instances it is too verbose, and hath some unnecessary repetitions.

He begins, with the consideration of all sorts of soils, and their most proper uses and management; he then proceeds to all sorts of manures, their qualities and most proper uses; he then treats of all fences and various sorts of trees for shelter, &c. then of stocking the farm; all seeds, tools, cattle, poultry, &c. Then of good husbandry, pasture and culture, through the vast variety to which it is applicable in all situations and circumstances; then treats of the accidents to which the cattle or crops are liable, with the most approved methods of preventing or cure, which includes all weeds, &c. and in all, purposes to give the farmer the advantage of others experience.—Lucky for him, if he makes use of it.

I shall follow this method in the proposed extracts and observes, tho' I cannot, nor is it needful for my present purpose, to enter into all particulars, and at present, can make but a small progress. But I must explain one term, very proper and often used by him and all writers on husbandry, viz. Dressing—which means, both proper culture, where it is applyed, and less or more of it, as suitable to the soil and circumstances, and sufficiency of the proper manures, for either grass or grain.

He says, " A pure soil is a fine mellow mould, without any mixture of other matter; but this is rarely found, all other soils are composed of this mould, with natural additions of one or more less fertile ingredients, such as sands, stones, clays and the like. And according as these are in a greater or lesser quantity, the soil
" is

“ is worse or better, and takes its name from that sort of the mixture, which chiefly prevails.”

It is not material, whether the above definition of a pure soil, gives compleat satisfaction; but I apprehend, the above composition of soils, if we add moss to it, will be comprehensive of all. And it is very material to attend carefully to the composition, and degrees of each sort, for a prudent judgment of their use and management.

The under-layer or bed of the soil, may sometimes improve and sometimes hurt it; therefore the farmer should consider this, and plow deep or shallow accordingly.

When the soil is thin and the bed till or clay, or any tuff clay which holds water, it is very injurious by starving and chilling the roots of vegetables; therefore in *Hartfordshire*, &c. severals cut many deep narrow drains, cover them with wood, and then with the soil, from which they reap great benefit; but this is very expensive, and in some places cost from eight to twelve pounds per English acre.

Every farmer should digg sundry pitts, for trial of several layers or beds, from which valuable discoveries of marles and other useful matters have arose; and ditching deep, besides making fences or drains, is very useful in this respect; redd of these, present and future, besides what is taken from pitts, will be manure for some sort of soil.

When the soil is purest, it is always richest, and most tractable: Pure mould, is known by its blackish colour with white streaks at first opening, and mellow softness; it is tender, pliant, short and easily crumbled or mouldered to pieces. It is often called the heart of the land, and live earth, because it is the best of the ground, and chief sustenance of all vegetables, and needs less dung or dressing. A prudent farmer will before he fix, examine his farm, and not be catched by quantity, so much as quality; as his labours should be directed, to bring his soil by mixtures, manures and tillage, as much as possible to that quality—the proper mixtures and culture for that purpose, will afterwards appear. He rejects clay as a rich earth but allows it is capable to be made so.

Some judgment may be made of the soil, by the aspect of the surface.

Generally the level vales are the richest, because the pure mould is light, and washed from higher grounds, and subsides here.

Strong and healthy grass or corn or any vegetable in these circumstances, unless occasioned by uncommon manure, and even luxurious growth of weeds, except the female fern, rushes, &c. the known children of barren soils, are indications of what is good. Care will destroy the weeds, and the same heart of land which nursed them, will give sustenance to an useful crop.

Where

Where a small fern which is called the male is found, which commonly flourishes under a shade of trees, it shews that soil is suited to the growth of trees.

Where rushes are not in bunches and more dispersed, and some yellow short flag leaves amongst them, it commonly assures of peat underneath. In the isle of *Ely* a farmer from these indications without opening the ground, will purchase a liberty of digging peats.

If such weeds are found strong and plenty in the land, as are found in the mellow beds of a well cultivated garden, he may be sure the soil is fruitful and fine. Cowslips plenty and strong, are clear proof of land proper for good grass, and thistles are so of its tending to clay and in good heart.

The corn-marigold, is a proof of light and sandy soil, more fit for rye than any other thing, but the fumitory, a low weed, with divided leaves and purple flowers will be plenty or strong only in rich land.

Plenty of blue bottle of a good colour, or cockle, are indications of a light but good soil fit for barley and wheat. Wild garlick loves clay; and wild camomile, and wild parsnip or swine root love a loamy soil, which is amongst the best mixtures.

The weeds which generally betoken a sandy or chalky soil, are low; and are poor and stragling in a strong land, but all that grow rampant and strong in good soil.

The improvement of all soils, depends in a great measure upon the breaking them, by which their parts are more exposed to the sun and air, and more fit to nourish the different kinds of seeds.

Clay soils of all colours, are tough weat and cold. The red, is the most stiff and cold: the yellow is next; the black is less so; and white least of all; but the quantity in a soil will ballance with quality; viz. much white is worse than a small degree of red. Some different managements, and uses, are proper for the different soils.

The sun and air, tho' they require more time than fire, will remove the cold and tuff quality of clay; and frequent plowing meliorates, by helping to break, and turning up the clods in different positions to the sun and air. When these bad qualities are conquered by industry, it is amongst the best of lands, and yeilds large crops; and when well dressed and enriched, lasts long.

When it is pure clay, plow deep; but where a different or mixed soil is thin about it; plow shallow, least you bring up too much clay.

Clay takes well with all manures except marles; but all must be well mixed, and without good tillage, often and deep, any is of small avail; but chalk, lime, sand or light mould from ditches or waters, or ashes or soot, also saw dust, or decayed stalks of any plants, or small brush wood or leaves of any vegetable, even of heather or broom or whins, and nothing better than sea sand or sea,
weed

weed—and burning of clays should not be neglected, for themselves, or light lands, with or without dung, are good mixtures.

If cost and labour be largely bestowed, clays are grateful and will make returns. A slight frost doth not penetrate it so much as other earth, but when severe it lasts longer and is more hurtful, especially after rain. If well wrought and dunged, wheat succeeds excellently upon it, and this makes the best return to the farmer, if straw and all is considered. If the season is dry, barley will do well. But it is the most adapted for beans, which need strength and love moisture. It is also excellent for clover, and when well wrought for turneps. The misfortunes which happen to its crops, are generally from a failure of dressing. And when it is got into good order by industry and expence, don't let its heart be broken by covetousness, which is folly; for moderation in numbers of crops, is the best rule of all, except in pasture, for a farmer. This holds in all soils and situations.

Pasture upon clay, where a good sward by fown grasses, alters and meliorates its nature in a large degree; when laid down in heart, its produce is peculiarly strong when flooded by rivers; or lying under higher light soils, it will produce any thing without manure, because the light mould from either is a rich dressing. But it is peculiarly useful for pasture, because, that retains it near the surface; therefore, pastures will be found most profitable, and are used by the most judicious; preserving a reasonable proportion of tillage, which is not with such, and ought not to be with any, one fourth of the whole, and yet they will have more grain. *N. B.* This will hold in all soils and situations, and is proved both by reason and experience of the best and most successful farmers.

Rain and water is very useful in this or any soil, where, from its quantity or situation, it don't wash away the rich fine mould, because all water contains some quantity of this vegetable mould.

Clay soils if not very tough, are found excellent for oak plantations, tho' the growth may at first be slower than in other soils; this seeming loss at first, it will recover, and the timber be better and more apt to grow streight and lofty; but it is not fit for the orchard, which should be in a deep or light soil. Seedling nurseries of all kinds do well in clays, because they are free from frost, and when moved to lighter soils take large growths, &c.

N. B. Oak by pushing its root deep, don't hurt the adjoining vegetables, whereas those trees whose roots spread near the surface, greatly starve and injure their neighbours. And it should also be observed, that the maxim, (he who marles clay, throws his cost away) is not so universally just; for the better sorts as above, are much improved by a rich crumbling marle, and yellow black and white loams, which will be noticed hereafter, must in several respects

be distinguished from clays. These are tough, but loams black or free, having more sand.

What they call hazel mould, is a mixture of yellow clay, with blackish mellow earth; is a good soil, very fit for wheat and rye, more so than for other grains.

The practice of allowing dung to be long upon the surface of this or any soil, before it be brought under furrow, is generally thought to weaken the dung. In many counties in *England* they with great success dung their fallows of clays after first plowing, and immediately plow in the dung, and after two or three months, plow it up and it goes down again with the fourth or seed furr for wheat. This makes the weeds grow, and mixes the dung and prepares all for the crop. With such dressings, especially with a light crumbly marle, they will have good grass by grass seeds, after seven or eight crops. They sow bear after wheat, and then such successions as they please. But this practice of so many crops, without new dressing, is not approved by the best farmers; and where the clay is very stiff, they find summer fallow each third year, both necessary and profitable, unless from special situation, they have plenty of dung or chalk or light marles, and bestow it.

Mr. *Evelyn*, tho' in most things extremely judicious and ingenious, his observes of clays that some are so obstinate that no culture will subdue them, and some so voracious, that no manures will satiate them, is not just; for all sorts may be made pliable, free and fertile. And as sand is recommended for most of them, it should be observed, that talk, or what the country people call sheep silver, is by the eye, upon first view often taken for sand, both in clays and marle. This if not attended to, may mislead, for the talk hath a fructifying quality, which the sand hath not.

If the clay is white or black, it is generally more tender and brittle, and don't need so many plowings; foot and all rich manures are best for it; about twenty shirlots of foot will sow an acre; so if it can be got, the small carriage makes it cheaper manure. Turff and dung, if well mixed and ly long, is proper dressing. Pidgeon or any poultry dung is excellent for black clay, sown by the hand how soon barly is sown.

Red, clay which is a brownish colour with redish tinge or cast, is the best to hold water in ponds or water courses, and if ramed and covered with stones, will last for ages, tho' the under bed be sand or gravel. It is also best to cover ale barrels, and if it should crack that is remedied, by beating it with brine, mixed with horse dung, it is best for grafting; and with chopt straw, for houses. outer or inner walls, when burnt, it is a good manure for almost any soil; the yellow is next to the red. for all those purposes, but is more liable to crack asunder and waste when wet. Both do for good

bricks when tempered, but more difficult to make, than the other sorts. Both red and yellow, are used for potteries; but yellow the most. It often happens, where there is a tender clay on the surface, there is a firmer underneath, the mixture of which, makes a firm soil. The bluish black clay, is the best for tyles. A black clay in *Northamptonshire*, they use for tobacco pipes, for it burns white; it is hard and heavy; it is rarely in a continued bed, but in large cakes, and is valuable. It is also used in potteries in *Nottinhamshire*, and carried a long way over land for it. There are other black clays, which burn red, and are excellent for potteries. There is a deep gray clay, which burns white for tobacco pipes. And some of a dusky lead colour much used for *Staffordshire* fine whitish earthen ware; it is a pale yellow when burnt. There is a black clay, which burns to a pale gray, which is good against purging. The common tobacco pipe clay is white. The finest, is at *Pool* in *Dorsetshire*, and isle of *Wight*, and is a valuable commodity; it is a clean white, not heavy, and almost as tender as marle, but must be mixed with some tougher. There is also of a dull white colour, mixed with a good deal of yellow, which is excellent for potteries. Most of the pipe clays are used by sugar bakers for refining.

I have been the more particular, upon clays, &c. that my countrymen may be more attentive to what they possess, or may possess. It is not the quantity, but the quality of land which will make rich, and many possess treasures, of which they are ignorant. When by the plow or ditches, any uncommon earths or mixtures turn up; the possessor should examine and try them with water and fire, and if encouraged, dig pits, for tho' foul near the surface, it is often pure and firm underneath. And he who neglects these, and particularly clays, neglects treasures. This should also encourage to ditching, which makes discoveries.

Where there is pure fine clay, there are seldom beds of sand near; but it is the reverse with loams; but clinkers, or the hardest bricks, for bottoms of ovens or pavement, are made of tough clay with little or no sand; but must be dearer as more difficult to mould, and needs much labour to work and prepare it. The fine yellow bricks used in fine buildings, is made of yellowish white clay, with small mixture of sand. And the bright red brick, for ornaments about doors and windows, &c. is made of a piece unmixed loam, containing or receiving a large proportion of hard sharp sand, but a brownish loam, is mostly used for bricks, and will be valuable in that way, when too poor for cultivation. A yellowish loam, will often burn to a high red, and serve for the fine red bricks. Some brown loams, burn blue, and make very strong and uncommon coloured bricks. And some loams are valuable for colouring potters ware, when the sand is separated from them by water, A gray earth, with lumps of yellow, when

when sand is separated, and the clay mixed with water to the consistence of a syrup, gives the deep yellow to all their earthen ware. And they use a bluish loam in some manner, for a paler yellow; and a dusky redish loam, for a black colour.

But there is a brownish yellow loam, which by fire turns to a strong red, which would be an estate where discovered. They have only found it in England, in Berkshire near Windsor, whence called Windsor loam, and sells at a shilling per bushel. It stands fire better than any other materials; therefore is used in glass-houses, &c. Possibly, such might be compounded, and thereby gain a valuable commodity for export, &c. the materials being a yellow tough clay, and a sharp hard large sand, of a pale brownish yellow colour. This would answer cost, though not found near each other; and some trials with fire, would prove it. They make red bricks of a hard nature, the other red bricks are sandy.

Loamy soils, tho' the best, except pure earth, when properly dressed, and very pleyable to culture and manures, are the most subject to weeds, because they nurse all natural to clay, or sand, or mould, or the different degrees of mixtures; but when these are conquered, such soil rewards the labour and cost.

There are great variety of loams, and should have, and generally receive their names from that part of the mixture which predominates; therefore, in his management of these as to culture, manures or crops, the farmer must adapt to each sort, those in a discreet degree, which is most proper for the article of the mixture which prevails, and when dressed, it is kindly to all vegetables. There is much of this sort in Aberdeenshire, which should encourage and rouse the farmer to industry; and many of the loams are the best materials for brick

Sandy soils of which there are variety, and of different names and natures according to colour, of which the black is the best, called so and approved so, by the black mould mixed with it; all of them when they receive proper mixture and dressings, are grateful to the farmer in a degree, not dispicable nor discouraging. It is said, some of the finest pastures in the world, are to be seen in *Oxfordshire* upon a yellow sand, with a large proportion of earth where the farmers keep it rich by frequent dressings. In general, the grass or any vegetables, are sweetest upon sand lands, and sometimes sturdy crops, when pains is taken. They are in drought liable to be burnt, but soon recover by the rain; and where there is command of water, they may be managed to good purpose.

They agree very well with turneps, potatoes, rye, buckwheat, carrots, parsnips, pease, vetches; and small clover, St. foin and lucern. These last, are early and rich grasses; but require the ground to be clean from weeds, and rich by proper dressings. All

marles; and even common clay, are good, also any richer and finer earths; mud from ditches, &c. The beech, hazzle, and holly, are the trees which thrive best in sandy soils.

Gravelly soils, have a mixture; pure gravel cannot be called a soil. These also vary in name and quality, according to their mixtures. clay is a proper dressing for all such, because it gives a binding to hold marle or any manure. Round flinty pebbles, is the worst sort; but more irregular or rough stones, or limestone will do pretty well. Barley, small clover and St. foin, succeed very well upon such, when well dressed with clay and dung, and it holds the dressing pretty well. When naturally much clay with the gravel, light marle does well, when the larger stones are removed. These lands are often early and fertile, when well managed; but when neglected, often produce large crops of small weeds, and but slender crops of corn. Such soils don't require much stirring with the plow: even in fallow, it often succeeds, with two plowings only. The folding of sheep upon them, hath a good effect, but not durable; chalk is found to last longer than any other manure with such. Where it is sandy, mud from ditches, will do well. When richly dressed even wheat will grow well. These are less liable to be burnt in drought than sand, for the stones shade some of the land, and preserve moisture. The beech often grows well in this soil, sometimes the ash and elm when the under layers are good. And if trees are planted in such, they wont hurt corn or grass, for they seek and find nourishment at a greater depth.

There is a small deep yellow sand, which feels like fine powder, that is much valued and used, for moulds for casting of metals. And a pure white sand is used, and serves the purpose of chrystal for making fine glass. River sand should be examined and being well washed, is often preferable to pit sand. Sea sand can scarcely be separated from the shells; but where these abound, it is a fine manure and often better than lime.

Sand or gravel of a bluish red colour, is not good for walks, because it dont bind; but when composed of irregular pebbles, with a yellow marly loam, this binds, and makes fine walks, and prevents the sand rising in dry seasons; and mixtures may be made to produce this, in like manner as suggested to make fine soils &c. and by screening, may be had at any desired fineness. If natural mixtures is not found for walks, and proper loam is deficient, mix tough clay with water, and throw it upon the sand; but do not exceed in this nor allow too much loam, because it is clarty when wet and promotes weeds.

When sand cannot be had, even gravel is a good mixture for strong clay; and the roundest of it, is excellent for high roads.

When

When the gravel hath loam with it, which is commonly of a marly quality, it will do good upon light hoaving lands.

Chalky soils are very rarely found in North Britain they may easily be known from white clay, by it greasy aspect and many differences; but especially after rain, the clay is more dark and chalk more white, then when dry. There is great variety of chalk; some is as soft and light as any marle, and this sort is better than the rock or hard unless made into lime.

Chalk when used for marking or whitening, is made by pounding the hard rock chalk and mixing it with water, which when it subsides is more pure, and forms into cakes. Pure chalk is often with success used as medicine, for soariness in the stomach, and belchings &c. It also softens hard water in pits or wells. And red black and other chalks, are sometimes found in lumps amongst the white, and will pay well for being preserved being used by painters &c.

This soft sort is often mixed with a grayish clay, which makes it an excellent soil; deep but few plowings, and little manure do with it, and produce weighty crops. Chalky soils, are happy in being little subject to weeds. Poppies, May weed, and some other slight-rooted annuals. The hard kind needs rotten dung; but the softer sort, doth well with mud; sheep folding, doth well with both. And it should be observed, that folding on these or any light soil, when done after tilling, gives by the treading, a firmness to the ground which it naturally wants. When chalk hath a mixture of clay, it is very binding; and then much culture is necessary, and pit sand is useful, wheat barley, and rye and pease answer well upon these soils well dressed; but all should be sown when settled fair; because rain after sowing, sometimes binds the surface so much, that the seed cannot rise. And tares and lentils, will grow upon the poorest. St. Foin answers well, clover don't answer, they produce sweet pasture, but not proper for hay or trees. Such and all light soils, are commonly found most in hilly countries.

Mellow mould or earth, the richest soil in its own nature, and needs the least dressing, is mostly found in vales, and most proper for, and yeild the most by grasses, for its tender quality will scarce in many place, support corn. The gardeners seek for this earth when old without culture, for hot-beds, wall trees, &c. They call it virgin earth. They often find what is excellent, about old decayed willows and other decayed trees. it comes the nearest of any to pure vegetable earth above described, and is often met with under the turff in fenny or low countries, being probably the fine, earth brought from higher grounds, or what subsides from rains &c. It is light loose and black, with very little sand in it, it is spungy when wet, and easily falls to powder when dry; but very different from

from peatland, which is rotten soil, and rotten wood, with some bituminous matter that holds them together.

This soil is the most fertile, and most tractable for all vegetables, and at least expence, if not too wet, which hurts it; therefore in whatever situation it be found, the charge of draining is well bestowed. It is some times mixed with a blackish blue clay, and sometimes with sand, when it is excellent for pasture with easy dressings but, when it hath clay, it answers then best for corn; but where wet, it feeds the leaf and stalk more than grain, therefore fitter for grass.

This soil is often found, where rivers frequently overflow; and the mud they leave upon it, is a richer dressing, than the toil and ingenuity of the farmer can otherwise give.

A prudent farmer, will diligently seek for such land, and not spare rent to obtain it, nor cost to enclose and manage it, for it will if he is not impatient, return all ten fold. When whitish streaks are found in this soil, it is often the spawn of mushrooms, and in the pastures of such, many mushrooms will be found.

When such soil needs manure, the best is rich or old rotten dung. But according to the composition of the soil, if it hath large sensible mixtures, as clay or sand, &c. it must be used accordingly, which reason will dictate, from what is most proper for such ingredients, and that in proportion to their quantity—and where too wet, if turffed and burnt, it answers well; and this practice if carefully executed, would do good and no hurt. It may be performed by shallow plowing with a feathered sock, but both to burn it and prevent burning too much of soil, it should be put into heaps, and attended, not to lose the ashes by wind, &c.

The most mellow of these lands, especially if wet and burnt, will answer exceedingly for cole or kail seed, which makes a very rich pasture or the seed valuable for oil, and refuse of oil to feed cattle, and next to that or after the cole, oats, or any grain, answers the best; and rye grass sown, with last crop of oats—many in *England*, manage in this way with great success; and when six years in grass, turff, and burn, and go the like round again; and so continually. Upon these, the white poplar tree thrives extremely, and is valuable wood; in *Cheshire*, &c. they use it for floors and lining of rooms and other uses, for which we use the fir dale, and it grows much quicker.

The proprietor or farmer may by search, or even by careful examination of what usually turns up, find in his land, many materials more valuable than crops, and at smaller expence or labour. Therefore all possessors of land should be attentive to all the mixtures and stratas he meets with. The neglect of which, deprives us of many commercial articles, and manufactures which we might have, which would both improve the land and consume its produce.

By

By the attention recommended, many valuable discoveries might arise, and amongst others, fullers earth, which as yet is but rare in *England*, almost all from *Bedfordshire*, tho' of such importance in all woolen manufactures. It is a genuine unmixed pure marle; very soft and mellow, and soon falls to powder by water. It is too valuable for manure, as there would be sale for vast quantities, and the price allow distant carriage. But where foul, and not pure for the manufacture, it is the richest marle and manure. Sometimes it is found in small mixtures in gravel pits, and elsewhere which would render even gravel useful manure. It appears in this situation sometimes in lumps of a grayish earthy substance, as big as one's fist; and sometimes a small streak somewhat perpendicular. It contains a sharp sand some clay, with a very soapy softness. When such is put into water, it forms three settlements, however often you stir it, viz. a sharp sand at bottom; then a yellow or brown clay; and at top, a loose covering of an olive coloured, light, crumbly, mouldring matter; which last is fullers earth. Therefore wherever such is found, it well deserves a reasonable search or digging for more, and what is more pure, at least for some distance or depth, when lumps or strings lead. There is found in some places, an earth of an irregular mixed colour, yellowish in some places, and bluish in others, which breaks in water, and takes spots out of cloaths; but is not so pure, nor of such a scouring penetrating nature as fullers earth. As blue and yellow, makes green; possibly, if those different earths were properly mixed, they might produce the olive colour, and improve the quality; or where such are found, the purer may be found deeper, as is usual in clays and other soils. Such things are extremely rare near the surface pure and perfect.

Also ochre, a very valuable earth for painters, glovers, leather dressers, &c. is found in many places of *England*. It is an estate where found. It is found yellow and red, sometimes separate and sometimes mixed, but the yellow becomes red by fire. There is also, of a purple, an ash, and a dusky straw colour. It is all light, brittle, dusky, and fine betwixt the fingers. The industrious Dutch get it from the *Shotover* hills near *Oxford*, and besides what they use and send elsewhere, return large quantities to us, after some cookery of it. This shews its value and demand: and doubtless it might be found in many places. It often, especially the yellow, lyes under beds of clay and sand, or in lumps among those and in gravel beds. The stone ochre, is usually fine, and ready for use; but what they call clay ochre, is usually foul, from which they purge the sand by water, and make the pure into cakes. Many tradesmen use it; amongst others, besides painters, marking sheep, all potters, glovers, buffmakers, &c. There is a coarser red stuff, called reddle, much of it found in *Derbyshire*, and yet sent to *London* above a hundred

hundred miles overland; it is more properly a marle, but dressed and used to many of those purposes.

Even peat so well known in most countries of *North Britain* tho' much wanted in some, is valuable for many purposes besides fuel for the country. It is reckoned the best fuel for the nicest operations of chymists, and goldsmiths, and some essays of mettals. It may be found in many places, under swampy meadows, where at present they have no notion of it, a black mould under the sward is commonly over it. Its ashes, to be had in great plenty in many countries, is excellent manure; especially for all clays or stiff or wet or sour lands, for common grass. An ingenious gentlemen in *Dumfriesshire*, and many others, value it so much, for dressings for all grain, especially barley that they are at great expence to prepare it. It is to be hoped, that gentleman, and others who practise it, will favour the public, with their experiments and directions, as to soils, crops, quantities to be used, manufacturing, and seasons of laying them on land, &c. But in *Berkshire*, the county of *England* of the best husbandry, they are valued so much, that I knew a proprietor near *Reading*, who luckily had some peat ground, who sold to the farmers, at from eighty to a hundred pound sterl. per acre, the privilege to cut and burn the peat, for sake of its ashes for manure, and the property of the bottom, which was as it is most frequently good clay remained with the seller. I mention these things, that all my countrymen may avail themselves of their respective situations and discoveries, and may be active and observing, to make discoveries. By ditches for fences or drains, peat and other things, may be discovered and made at the same time.

I have known, excellent potatoes, and rich crops, by lazy beds on moss land, especially by Irishmen, without any manure, but crops of heather and broom, &c. In *Lancashire*, which produces immense quantities of potatoes, so that from *Liverpool* only they send about twenty ships loading annually to *Dublin*; besides what they send to *Gibraltar* and many distant parts beyond sea; they value black, and peat ground for it; and for several miles about *Ormskirk*, where they are allowed to have the best potatoes, it is all peat land. Where they get at red or white sand at the bottom of the peat land, they bring it to the surface in such quantities, to weigh the land which hoaves; a traveller at first from its white surface takes it for rich limeing. They lett such land to poor people, at from two to three pound sterl. per acre, for potatoes, and they have rich crops of barley, &c. after them.

The practice of burntland, which is usually of peat ground, is extremely injurious to the country, as it is commonly practised. They fire the furs, and leave to accident and the weather, to burn or extinguish them. By which some are sometimes not warmed, whilst others

others are reduced to ashes sometimes to the channel, and often to such depth as will not produce any thing. This practice, besides consuming much fuel, where it would be valuable, and which probably had occasioned the scarcity where it is now felt, often disappoints the very design; for either extreams of deep ashes or unburnt peat will produce nothing. In *Lancashire* and allwise countries, they turff all such lands, and burn all in heaps; by which there is small if any waste of land, all parts hath supply of ashes, and none too much.

The ammendment of a soil depending wholly upon the breaking the land with the plow, &c. and altering or enriching it by proper dressings; I shall offer a few further hints as to manures, and so conclude for at least this year.

A soil may be rendered worse than it naturally is, by bad management, as certainly as it may be improved by good. Therefore, what is offered as rational, and confirmed by the success of others experience, should in justice to one's self and country, receive a fair and patient trial.

Manures are natural or artificial, each of these have great variety, and each may do hurt or good, as properly or improperly applied. I shall avoid as much as possible repetitions,——but in things of this nature, and especially when following another's method, these cannot be so much avoided, nor such connection or regularity in other respects retained, as might be, if the composition was wholly new, and more studied; which in these respects, things of this nature don't require, if materially right in the essential parts.

The most general and most valuable manure is marle: Providence hath been so bountiful, that few places are without it; and yet farmers, tho' laborious in other articles, have in general been remarkably negligent in their search for this valuable commodity, a treasure when found and applied with judgment. Many countries, and especially the counties of *Norfolk* and *Lancaster*, were in my memory, remarkably proverbial, for bad grain and grass, poor tenants, and low rents; and by marle and good husbandry, all these have been improved, to be at least equal to any county in *England*. And people should not be discouraged by even the miscarriage of first trials.

The deeper marle lyes, it is usually the more pure and rich, which is some comfort and ballance, for the expence of removing a deep cover.

Pure marle, is a substance, not unlike in many respects to fullers earth; it is fatty to the touch, of a tender fine nature, will fall to powder in water, unlike other earths; not tough like clay, nor dusky like ochre, nor sandy like loam. The harder and more compact kinds, will be slower in dissolving by water. In general the whitish is the softest, the bluish the hardest, and red, yellow, or blackish of

a middle degree. The harder it is, the more early should it be put on the land, for corn or grass, that it may have suitable time to mellow and soak into the soil. In *Lancashire*, &c. they marle in June and July for the subsequent sowing.

It is lamentable, but certain truth, that marle hath been antiently used in many countries, where it is not now known; as in others, there are visible proofs of antient industry in moving stones from their land into bawks and cairns beyond the latter practice. Hath this generation just ground of complaint, when their poverty is plainly owing to their own neglects?

If the farmer hath choice of marles, and his tillage and pasture land be of the same nature and proper for marle, let him use the white for the pasture. because it incorporates most easily; and the blue for the tillage as the plow helps to break and mix it. Tho' some are so hard. that they with difficulty break by a hammer and must ly at least a whole winter, before they will break. These often are the most durable, as the shell light marles have the most immediate effect.

There is in many places, marle of a mixed colour, blue and red; the blue being in streaks or veins through the red. Some of this very fat. And in *Cheshire*, they have of all colours, what they call slate marle, because it rises in fleaks as slate doth. There is also dice marle, which breaks into square stones.

Chalk and some binding marle, if put into too large quantities, which the farmer's greed for corn crops, sometimes occasions, hath in some instances, rendered the land compleatly barren, until well stirred by fallow.

In *Staffordshire* and *Cheshire*, there is found a grayish or ash colour sand stone, which if it break by the weather and crakle in the fire, is and may be used with benefit. Also another of a dusky colour and tough substance, which do well for sandy soils; also another sort of a yellow colour and more tough; also the paper marle, which separates in thin fleaks or leaves, is much esteemed. There is also the steel marle, of a dusky colour, sometimes spotted with red, sometimes with blue, it is very hard when broken, falls into square bitts, and upon the ground, lessens its size in successive crops, until at last it is not distinguished, when it hath its strongest and very good effects.

If discoveries are not made by careful observation of the furr by plow or water, or ditches or ponds, or pitts, the industrious farmer should bore several parts of his land with the augre, or an instrument, which every proprietor of land should have for his own and tenants and country's benefit. It may be tried by the instrument, at least six feet depth, at small expence of time or any kind. Under clay, marle is often found, as also under black mellow earth in low lands, where the redish kind most frequently occurs; it will sometimes

times appear small or thin, but if followed, often thickens. It is easily traced by the auger. Sometimes it is found under sand or gravel, but these are more frequently the clayey sorts.

In some parts of *Cheshire*, but it is too much, they will lay from seven to nine hundred cart-loads of marle upon one English acre, when it is found in the corner of the field, which it often is in that country which will cost them from five to eight pound sterl. per acre, but by good management, they will take twenty successive crops, without intermission after it. They plow shallow at first, not above one inch of the soil and deeper gradually, and give some slight dressings of other manure during that time.

Sandy and all light soils are the most sensibly enriched by marles of the clay brownish or yellowish kinds: but the fat and tender marles, would soon subside below the sand, &c. This directs to proper mixtures of soil and marle according to their respective natures, also in proportion to their respective natures as to quantity. In *Cheshire*, they exceed as above, and in *Staffordshire* they fall into the opposite extreme, giving only about twenty loads per acre; the best mean or medium, from experience, is in the general for tillage land, one hundred loads of a cart and two middling horses per acre; grass land takes less. But to vary this reasonably, according to marle and soil; viz. if soil is very sandy or gravel with little mould, and the marle not a pure clay, but of the mixed kind, with sand gravel or loam, more must be given; but if the sand or light soil have a large share of mould or clay, or loam and marle be pure a lesser quantity than the hundred loads is proper; but if burnt which some practise, the half is sufficient; and in like manner for all other soils and marles. And the time of laying on must be attended to according to their different natures as before. But if clayey should not be laid out in the beginning early in winter, lest the rains make it too tough, and obstruct its usefulness. Therefore summer for tough marles, and spring for tender, is best, and the sooner it have some mixture with the soil its effects are quicker and better.

The best way of sowing upon marle land is found from experience to be under furrow; but plowing as abovementioned in *Cheshire*.

If the farmer sees his land in fair weather, look like a hoar frost, it is some proof of the due quantity, and goodness of marle, and its agreement with the land; and its crops will be better even from a bad soil than the best dung'd lands, and commonly answers in all seasons wet or dry when others often fail.

If by unexpected much wet, his surface be crusted or tough by the marle, some of it burnt, or some lime with the rotten dung, will break it and improve the whole.

If the land marled is upon the descent, the marle should be thickest at top, and sparingly at bottom, for the rain will convoy supplies from the upper parts.

If eight or ten crops of grain, are taken, after the marle, if the marle be a pure clay, the land should have a dressing of lime and dung whether for grafs or corn, otherways it may retain the binding quality, when it hath lost much of its richness.

Mud is a valuable manure of earth, being the finest mellow, parts, brought by water from other places; and found sometimes in rivers, &c. of small current, ponds and ditches and low lands, where there are higher near them. That of rivers is esteemed the best, it is all very fertile when properly applied, but not near so durable as marle, tho' it is good for tillage land, it is best for grafs.

Mud if from clay, will give a solidity to light soil, and if from sand, will break and open tough ones; and river mud is the nearest that can be to virgin earth; therefore very proper for gardeners, &c. All mud is an excellent mixture with dung and litter.

As the barrenness of most soils, proceed from the superabundance of some one ingredient, not in its nature very fertile, in the general mixture; there is scarce any one kind, that may not serve as an useful mixture and manure for some other.

Clay is a manure to sandy and gravelly lands, when well mixed, it brings these to a loamy soil, which is a good one. And clay from pits, is better for this purpose, than from the surface; being probably more pure, and more of the nature of virgin earth. The red or yellow clays, are best for such lands, unless they contain a large mixture of earth, when the blue clays will answer. Once manuring with such clay, will last for life, about eighty loads to an acre, to be encreased or lessened, as directed about marles, is the prudent medium. And tho' it should not seem to answer the first or second crop, the farmer should not be discouraged, because it would certainly answer and reward all cost and trouble; but it needs being well mixed, which when tough may require time. Such lands are not at their best till the 3d, 4th and 5th-year.

But the calcining or burning clay for manure, gains ground and esteem daily. The fire breaks the compact texture, which obstructs its fertility in its natural state. It is excellent for dry or loose lands for tillage. There is a black clay found in coal pits, naturally crumbly, which mixes well with any soil, it usually lies immediately over or near the coal; and may if found, prove some indication of coal.

A red loam or good brick earth, will answer upon gravel land, of smooth round pebbles, better than pure clay. And this will also hold with a dry hard sand, if not much sand in the loam. And it answers for chalky lands, and likewise for all loose mellow soils; and loamy soils

soils are found almost every where, and receive and keep dung well, which are thrown away upon hungry and loose soils.

Even sand is an excellent manure in some cases, where used with judgment. River or the cleanest sand, is best for a tough clay. Pit sand or surface of roads, do well with what is less tough; and when the clay is poor and cold, if sea sand cannot be had, if hogg or poultry, or sheep's dung is mixed with the sand, it will enrich as well as open, and where there are stiff lands, a layer of sand in sheep cotes of houses, every now and then, enlarges and enriches the manure. In like manner in hoggs stys, and pigeon and poultry houses; but in all use of sand, frequent and careful plowings, are needful to mix well, and prevent clots of sand.

Tho' clear sand is most fit for clays as above, sea sand tho' without shells, hath by its salts, a fertile influence upon almost all lands, except hard sand and gravel, and when much mixed with shells, hath almost an universal good influence wherever used. The largest grained sand is the best for clays; and sea sand from the shore, where daily flooded is better, if equally impregnated with shels, than from deep water, even if it could be easily had, about ten loads per acre is a good medium.

Where sea sand is used and well mixed wheat may be the first crop; but if other sand, or marle, or clay, oats is generally found best for the first crop. Grass for pasture after sea sand, is of all the sweetest and most fatning, and the same after salt water, about three tons per acre, or made salt about four bushels per acre, and some less or more according to strength or stiffness of land.

The sea sand from creeks and cavities of rocks, is the richest, having more salts, and the fine substance of sea weeds and dung of sea fowls, and five load per acre of this will answer. Barley from this and all sea sand, will have short straw but remarkable long ears, and the grain firmer and finer than from other manures. Shell sand is richer than any lime, for, besides being of the same quality, and having the addition of salts, they partake of an animal body, the richest of all manures. But all sea sand agrees excellently with barren heathy land, where a clay bottom.

Even gravel for a cold tough land, is a good mixture; most wet lands are so; it warms and breaks them, and gives way to the wet, and roots of Plants: The rough and rugged is better than the smooth; and all large stones should be picked, or screen'd from it; none should exceed the size of a walnut. It may be used with success, where there is not proper sands or other better stuff upon all clays, and even loamy soils, which rise in great clots by the plow; which indicates much clay in it.

Also, the chippings of stones from quarries, &c. do great good in all the cases mentioned in the preceeding paragraph; and such ma-
nures

nures are from their nature very lasting, and found so in experience; and even any stones, not very large, and of ragged shape will have simular effects, in some degree, where better cannot be had.

But there is a caution needful as to all natural manures, except the rich marles and lime, water and shells; that, they must not always expect their good effects immediately, nor always depend upon them alone; for altho, they do great good, and will operate greatly by themselves, as hath been noticed; yet in some cases, their chief, at least their durable excellency is, to prepare the soil for, and render it capable of benefit from other proper dressings. For instance, cold tough clays, would not yield properly to dung without other mixtures, nor would dry sand or gravel, &c. retain it. And this observe, includes chalk which hath this peculiarity, that it meliorates soils of the most extreme opposite natures, viz. Stiff cold clays and hard sand; for the first, soft or burnt is best, and unburnt for the last. But some stone chalk is so hard and obdurate, that it will not fall and separate by weather, but must have fire. The softest and best kinds are usually found under yellow marshy clay. Chalk and strong sower clays, are hard and are the strongest instances of any, and a convincing proof, of the great benefit of judicious mixtures; for these are naturally barren, and by such judicious mixtures, become exceeding fertile.

When chalk or chalky substance can be had, it makes an admirable mixture with one load of it, and one of river or other mud, and two or three loads of dung. When used alone, about twenty loads per acre is proper; to be laid out on the ground before, or early in winter if the chalk is hard, and in the spring if soft. This last sort, is very good for pasture, and makes the grass richer for milk or feeding tho' its quantity wont appear increased.

Salt and salt water, either from the sea or salt springs, is excellent manure, if properly used, some use only two bushels or meal firlots of salt for an acre, but if land is barren three or four may be safely given, and bay salt is best; also steeping all grain to be sown in brine (a thing of small expence) is very useful, from six to twenty four hours according to age, strength and firmness of the grain. It is tolerable brine, when an egg swims. An excess of salt or steeping seed, will do hurt.

Tho' the use of sea weed, is confined to those parts near the sea, yet its use is too much neglected. It hath the advantage of salt and vegetables jointly; and all vegetables even weeds if rotted, are good manure: but these are so in a special degree by the concurrence of salt, and some imagine, they have also the animal qualities, having at least numbers of insects in their leaves and cavities, if not made for or by them, as the coral and other sea productions are supposed to be. The sea weed lasts longest, when put on as taken from

from the sea, unless its continuance be sacrificed to a more immediate effect. Sea shells are also too much neglected; but they should be broke or bruised by proper instruments before they be used. If large or stubborn as some oyster shells are, half an hour of fire, will make them break with ease; but even this fine manure, and spaven or intrails, &c. of fish, which is still more rich, as all animal manure is the richest, may do hurt by excess in quantity. Twenty loads of uncalcined shells per acre, is a large allowance; and according to their or other manures richness, the quantities should be proportioned.

I have said above, all vegetables are good manure; but the most juicy is the best; if weeds are used, they should be cut before they run to seed; and all the vegetable kind are the better for early effect that they be well rotted. All rotten wood that will easily crumble, is good, and all leaves and small branches, and even old stumps or roots, if but near rotten, should be collected carefully for this purpose, by the prudent farmer. Ferns are excellent, and crops of almost any vegetable, even heather itself is valuable; all may with judgement be used alone, but are much better when mixed with earth and dung to ferment. Malt dust, the refuse of tanners pits, ditto of butchers slaughter houses, and flesh markets, and of all dressers of leather, or hoofs or horns, all animals hair; all rags, and those best which are improper for or least valuable to paper milns; all refuse of dysters, or cloath manufactories, or taylors, shoemakers, &c. saw dust, small chips and shavings; human and cattle urine——sudd from bleach houses, wash houses, and refuse of dairy and kitchen, when not applied to better purposes, and many other particulars should as much as possible be collected and used by the farmer. All these will answer any soil, and pay for long carriage, as small quantities go far upon the land; for many of their farmers in *England* will pay from seven to ten shilings sterl. per bushel and at same time put thirty bushels to an acre and yet they make profitable returns.

But as dung is the most general manure, some few further hints concerning it is not improper; because as the farmers success for grain or grass depends much upon proper manures, his success from dung, depends upon a careful judgement of its proper compositions, quantities and applications; for mistakes in these, may do hurt in place of doing good, besides the loss of his labour and cost. The dung of different creatures, are rich in different degrees, and suited to different purposes.

For the propagation of vegetables, the roots must have free access through the soil to get nourishment, the soil must be free from too close contact, which might obstruct their passage, and at same time, free from too great looseness, which would prevent the roots touching it, which is necessary to receive its nourishment, and a certain firmness

ness to support the plant, that the roots may not be disturbed; and thirdly must contain a certain richness and warmth, suited to the nature of the plant.

For grain and many other plants, which require frequent sowing or planting, culture by tillage or otherways and all proper manures, which includes dung, separately and jointly operate for all those three purposes; for grass, trees, and other vegetables; which don't require frequent culture, manure by itself, hath these effects. A judicious understanding and application of this, comprehends all good husbandry.

We know all dung is naturally disposed to ferment; and we know from experience, that what of itself is liable to ferment, will ferment and work up a large quantity of any proper matter amongst which it is mixed. A little yeast or leaven, will ferment, lighten, and warm a large lump of dough; and thus dung works upon land, and hath successful effects, when judicious quantities and qualities are used.

Mr. *Tull* and many other ingenious people who trust entirely to culture, and reject dung for tillage or cultured land, are too partial to their own system and experiments; for from experience and reason, both are best; therefore the prudent farmer should carefully use both, and in this and almost every thing avoid all extremes, and judiciously adopt and proportion all to the natures of things. This caution, upon which his whole success depends, cannot be too much impressed, and should be constantly kept in view.

From the manner in which dung operates, as above mentioned, it is evident that it is not so needful or proper in equal quantities or richness, upon soils which are hot and loose already, as upon these which are cold and compact or tough. And if rotten dung, be too long upon the surface of the ground, before its effect is wanted, the sun, wind and rain will exhaust much of its virtue, and if it be buried too fresh, or in too large quantities in rich soils, it will occasion weeds. Also the dung differs much in its quality, according to the different creature, and what it eats, and the mixtures put to it. The matter digested, the degree of digestion, and mixtures must make a difference; also the degree of fermentation it is in. A judicious consideration of these, will lead to the proper mixtures and use of it. The mixtures, should be adapted to its intended use; and its application according to its nature. For stiff soils there should be mixtures to make them free and open, and free soils that which contributes to bind and stiffen. Cold soils should have the hottest manure, and hot soils the coolest. And mixtures and stirring, promotes fermentation. All urine brought amongst the dung is a great advantage to it.

Pure horse dung, and the smaller without litter, the better, is best for pasture lands, and if preserved from the weather will go far; especially if urine be mixed with it, and even earth and mud mixed with it do well. The paring of the roads, especially at stations where horses stand, is excellent for stiff lands. For culture land, except to force things early in a garden, a proper mixture of earth, both increases quality, and takes off any canker rankes.

All dung, as hath been observed before, may be enriched, by all animal and vegetable mixtures; also by being covered from the weather. And it is properly advised by many, to carry all refuse of kitchen, waste beef, broth, brine, blood, soap suds, all from the dairy, and all refuse from the house, and all such things, to the dung hill. Especially if the dung ponds be well paved to retain the moisture for which it must have a clay bottom, or stones laid in clay, and if it be covered, to prevent exhalations, All drainings from stables or byres, which commonly run to waste, should run into these pits; and in countries where wood and heather, proper covers can not be expensive; and by the common country cover and building, it is still much cheaper. But too much rain, should be prevented running into the pits, for they should have no more moisture, then is needful to promote the ferment. And all sorts of dung and ashes, &c. may be mixed altogether, unless there be special occasions for them separate, and sufficient quantities to deserve being kept so. Old *Markham* says, that one load of such mixed covered dung, is worth five. If so, it is a cheap purchase of rich manure. And by a double or triple quantity of earth, all well mixed with it, the whole will be equally good, and thereby a great additional cheap purchase. Such compost, when rotten, may breed some worms, but will produce much fewer weeds, which are more hurtful.

In pastures, where not too bare, but a roughness left, which should always be preserved, the dung is somewhat protected from being exhaled and wasted by the weather, and small dung is soon imbibed and covered; but to let it ly upon tillage ground any long time before plowing, is certainly a wasteful practice.

Where three plowings is given to land, the best time to lay it on, is before the second plowing, and plowed soon after spread; it is thereby better mixed, and hath time to ferment the earth, and hath more immediate effect, for twice the quantity of land is by this under its influence, than by any other way.

If weeds or worms are apprehended, the dung may be allowed to cool a little before plowed; but when its utmost warmth and strength is wanted, it should not ly uncover'd; so discretion must govern according to circumstances; but well rotten dung produces few weeds. However some think, that when most rotten it is weakest, the heat and action being much gone; but others think it hath a more extensive

operation on the ground by mixing and acting more extensively, and feeds the ear more than the stalk, and less productive of weeds. But it is certainly less hot, and most proper for warm soils. But then, the land subject to many strong weeds, is generally pretty rich, and needs less of quantity and strength of dung.

Too much dung, if strong, unless the land be very tough and cold, is apt to make the straw rank and of a strong reed, but the ear thin and light. Forty loads of good dung, are sufficient for a Scots acre of mellow land; and according to qualitys of land and dung to augment or lessen the quantity; and better dress often, than too rich at once. But pasture is not so much hurt by any excess of manure. Dung is a medicine, of which an over dose may kill, when a moderate one will cure. Tho' it may be over done at once; yet the farmer cannot probably have too much of it, as his whole land pastures and for culture, will be the better of having it frequently.

Pure dung, and in the state of its strongest ferment, answers for barley better than any other grain. And if fallowed after that crop, is an excellent preparation for wheat; the dung being thereby well mixed and the land having had time to ferment.

Cow dung not being so hot as horse dung, is fitter for hotter soils. All dry food of vegetables, produce hotter dung than green food. But cow or ox dung, doth better with mixtures than alone; and even improves by mixing with horse dung; its salts or substance, whatever its nature or active quality be, evaporates sooner than other dung; therefore mixtures to imbibe or retain them is needful. We have not as yet certain knowledge of the true qualitys of dung in respect to their action upon, and rendering land fertile; but experience assures us of its effects in the manner before mentioned.

When a compost dunghill is made, wherever it is, in yard or field where there is not a fixed cover, let it be covered with green turf, to keep in the heat and mellow it. Such compost, should have at least two parts earth, and mud, and marle, &c. to one third dung. This is easily performed, by the layres or stratas of dung being thinner than the others. After lying some time to ferment and rot, they should be well mixed and stirred; and covered again, which the same turff may do; and not carried out untill just before plowing.

Sheep dung is amongst the most valuable; it hath a certain superior richness, and yet is not thought very hot, like other small dungs of hogs or poultry, &c. receiving its benefit by folding, is common and good; but much of its effects are lost in that way, much of its richness evaporates: therefore, if so used, small folds by flaiks or hurdles, or other ways should be used, that the whole may be equally dunged, and such part may be soon done, which should be soon plowed. This practise some think, makes it go ten times further

ther, so equal to ten times the number of sheep. Also, much dung might be saved by herds in their pastures, where it doth little good, and where too much about the entrance into folds, &c. that should be dug and dispersed. But what is preserved in cotes or houses, or if a covered fold was used, which some industrious people do use, it would add quantity by proper mixtures, and save the whole strength. There should be at the bottom of all cotes, a foot and a half thick of the proper mixture, to receive dung and urine, and weekly after to renew a layer of mixture, and take away for land or other dunghills, as is needful. The whole bulk will be a right manure; which is a proof of what we lose by neglects. A few sheep, will thereby do more good, than five times the number, and if wet, is apprehended from clay, or earth, where that is the proper mixture, a good coat of sand or litter, or both over it, will prevent any bad consequence.

This dung suits all soils, but a cold clay receives most benefit from it; and in this case, a mixture of sand or small ragged gravel is a proper mixture; and the mixture may be suited to the nature of the land for which this or any dung is intended, and should be varied accordingly, for much profit is gained, and much dung and expence saved, besides avoiding disappointments, by such discretion.

Hoggs dung is also very valuable, and they are so for the sake of their dung, if there was nothing else to recommend the breeding of them; but in a country which hath reputation for pork, and where there is encouragement for the exportation of it; and where there are so many meal mills to feed them, which, if they were not forced to breed, could feed at least four times more; a great loss to the country and millers; it is surprising that the farmers who have many offals about their barns, and would have their dung stirred and encreased by them, should be so negligent, as not to have and breed them. But the management and other value of them, comes more properly under another article.

The objection to hogg and poultry and other strong dungs for grain, that they produce weeds, is a proof of their richness, for what will produce grain, will produce weeds and all vegetables; for even fallowing produces them, but being renewed kills them.

The richness of hoggs dung is well known, one load of it is at least equal to two of best horse dung, and is a proof of the observe above, that the richness of all dung depends in a great measure upon the food the creature eats; the dung of those which eat dry forrage, is richer than those which eat green; and grain is richer than straw, and animal food much more than vegetable, wherefore also, all belonging to fish or animals, and many other dungs are richer than vegetable dung.

Hogg and poultry and pidgeon dung, may be increased in the same manner as directed for sheep. And mixing all these with other dung,

especially for grain, greatly improves the whole, and moderates its rankness when by itself; but all these are excellent by themselves for meadow grass, and all fruit trees; but as its strength evaporates soon, it should be soon mixed with the land, and when used for grass, the approach and time of rain, watched and taken; all weeds, bean straw, cabbage roots and earth should be thrown into the hogg sty and poultry house or yard, to imbibe the mixture and mix with the dung, it may encrease the quantity ten times more than otherways would be, and all equally good.

In many countries and in a special degree in *Staffordshire* they know the value of hoggs so much, that they sow land on purpose to feed them, pease, turnips, potatoes, spring and summer and winter kail, and clover and rape, and winter tares, and buck-wheat; all these are very well bestowed upon them, and afford a succession of food; and their dung and culture is a good dressing of land and preparation for future crops of grain or grass. Slight manure, will prepare a crop for them, and they will prepare for a rich crop.

Pigeon and all poultry dung, promotes the fulness of the ear in wheat and barley and all grain. The straw and blade will be small, but the ear long and good. Farmers in *Hartfordshire*, will give ten pence per bushel or meal firloft, and send fifteen or twenty miles for it. Forty bushels is enough for an acre; it should be sown immediately after the seed, and these harrowed together. It is superiour to all dungs for hops. Black earth put into their houses, is also an excellent mixture, and some mixtures besides for encrease of quantity, are necessary to make it separate and sow; also, receives the fermentation, and promotes it in the land; the bottoms of hay and corn stacks are excellent, especially for grass. It richly pays your labour to renew the bottoms of your hay, corn and wood stacks yearly.

Rolling in dry weather, and when land is dry, is very proper and useful, with any of these rich dungs, but very hurtful when done in wet.

All rags are a valuable and durable manure, but such as are proper for paper, ought to be so employed, because such application is more valuable to the country and person that collects them; and it is much to be regretted, there is so little care of these, but many of them burnt. And as rags are valuable, so is paper, which is also heedlessly destroyed. Judicious farmers find their account to bring them forty miles over land, for manure, and old rags, &c. for the same purposes and reasons. Twenty-five bushels of any of them will serve an acre.

Lime is a manure generally known, and doubtless very beneficial when used with judgment, but is useless, and even hurtful when indiscreetly made use of.

Lime

Lime may be made of limestone, chalk, marble, sea shells of all kinds. Some rich white marles which ferment with acqua fortis, chippings of marble is excellent; and all spars found amongst all minerals: these two last make the strongest kinds almost double.

Each is best for the purposes to which each is suitable, and the materials and manner of burning, if there be choice, should be adapted to the purposes intended.

Lime-stone is much more common than people imagine, besides the use of aqua fortis, which boils upon lime-stone as every one knows, it may be tried by a common or smith's fire, and that encreased or continued according to the degree of hardness of the stone; and as there are great variety of colours of lime-stone, both of one colour and mixed, persons are often deceived, when they don't find what they see in neighbourhood; as also by not finding it at a certain depth; where as it is found at all depths down to forty or fifty feet, and worked to advantage notwithstanding, especially if situation allow level for water and rubbish. Augurs and hush dams, may make discoveries. Also, there often occurs, useful lime for land, by encreasing the quantity tho' involved with much refuse of earth or other stone, which will break and fall by the fire, tho' it be not proper for building; a hush dam is, water brought to, or penned up at a proper place, where there is a full or quick current, to cut the earth, &c, and lay the rock open to view.—If the fall hath not strength, the earth must be loosen'd from time to time.—Many minerals are discovered by this means at a small charge. Some indications of lime-stone may be had from the surfaces or water which runs from it, which produces a sweet grass and fine verdure.

A wall of lime-stone is best for the kiln. It may be square or round at pleasure or as ground favours. It should be wide at top and narrow at bottom like a corn kiln, untill two thirds of the height, and gradually drawn in to about five feet wide. If the fuel be coal or peat, and the quantity wanted large, what they call the perpetual kiln is best, which hath two branders of strong iron bars, eighteen inches from bottom, and the same from each other, betwixt which the fuel is put and thereby hath air, and is not chocked by the ashes. There is also a lair of strata of fuel betwixt each thick lair of stone or other material, and these continued, as they sink when burnt; for when well kindled there is no more occasion for fuel betwixt the branders; the fire of the kiln, when come near the top will burn what is above if not smothered by too thick coverings at once. Wood, broom, whin, &c. will also answer for fuel, if dry and pretty thick. When burnt most of it will fall through the bars, which is taken out with iron rakes; but is at some times chock'd by getting too close together, some small spare doors or openings should be left in sundry parts of the kiln, which can be shut by loose stones, that it may be stirred

stirred and opened by an iron pocker or slack iron, which will remedy any inconveniencies of that kind, and also give wind and air when needful to blow the fire. But if wood, especially brush wood, be the only fuel, the apperture at bottom of the kiln must be larger; and in place of iron branders, there may be arched bars with strong rough stone; in this case, the lime-stone need not be broke in small, which is needful in the former, because the flame of the wood, will penetrate and dissolve even a large lump, but in this case they must be all built open, that the flame may get betwixt them, and lairs of wood intermixed, will continue the fire more effectually to the top, fuel should be the last lair, the coarsest small coal will answer, so it be got cheap.

One hundred of faggots, three feet long and round, will burn forty bushels of lime, and ten bushels of coals will do the same, when the stone is not hard, lime may be made in twentyfour hours; but in proportion to the hardness of the stone, it takes more time and fuel; and all materials fit for lime loses of weight, by burning from one third to less, according to its hardness; all sandy, stony, gravelly and light lands, all of them supposed to contain a reasonable quantity of earth, are most improved by lime. But it is best for all lands, especially cold, in shells or unflocked, and by many is esteemed best by being mixed with other soils according to its destination, this last may be done with the heaps upon the field where to be used, and save carriage, for poor sandy or gravel soils, two parts of cow dung and one part of earth is a proper mixture, and thereby the lime goes four times further, also black mould four times the quantity of lime, and dry mud three times the quantity answers the like purpose. And for mossy land, ashes of the land itself pair'd and burnt is a good compost, about equal quantitys of ashes and lime, one hundred bushels each per acre, will probably enable the first crop to pay all expence of inclosing, draining, tillage and manure. this hath been often experienced,

Lime by several writers, besides the new System of Husbandry is said to last longer by proper mixtures, as above, than by it self alone; and that by the mixture of cow dung it lasts two years longer than with horse dung.

Lime stone which hath lain sometime exposed to the weather, is thought not to burn so easily or make such useful lime, as when fresh dug from the quarrie; also that a square stone of large size, will burn more easily than round lumps much smaller, and where lime is used by it self for grass or leys, it is better any time before midsummer than after, and spread it how soon laid on, tho' lime dont answer well upon pure clays, and in a manner lost if used alone upon such, yet soot and ashes tho' also produced by the fire, answer best upon all clayey soils; and soot in particular, doth for them what
lime

lime doth for other lands; but it answers with all soils, when employed with discretion; it hath also a more sensible immediate effect than any other manure, for early sown upon the grain it will soon shoot and have strength to overcome any injuries from the season, forwards the ripening and improves the ear. Twenty bushels will do, but thirty is good allowance to an acre. It is equally usefull to grass as grain, and ashes in great quantites, especially if suds and chamberlie be thrown upon them, answer the same purposes about fifty bushels to an acre.

Six cart loads of ashes without mixture and when to be plowed in are enough for an acre; but except for wet lands, some think they do better and go further by mixtures with dung, especially from horses and soil suited to the land for which intended.

Burning of rank stubble, affords the most equal and most cheap, tho' but a slight dressing by ashes; and somewhat dries, warms and crumbles the ground, and may destroy some weeds; and if broom, whins, brushwood, or any dry vegetable be strowed over such field, it helps the stubble to burn and increases the ashes. All vegetables, produce useful ashes. In many low lands, and especially in *Lancashire*, they make much use of and benefit by ashes from the pairings or surface of the ground to the root of the vegetable, they do it by men with a breast plow or slaughter spade, but it may be much cheaper performed by a horse plow, and a roller properly iron'd to cut it across. It is set up in small open heaps to dry, and hath additional fuel as the nature of the ground or season requires. They may be rendered useless by burning too much; when a dark, or red, or yellow gray, they should be extinguished, but never allowed to burn to be white; a slow and mouldering fire, is therefore the best; and tho' the outside be but well cracked by the fire, at least retains its shape without falling, it is not the worse. When cold, they are spread in a calm day, and under and all round the heaps, they should be pair'd perhaps three or four inches deep, as the fire hath penetrated, and such pairing spread also. They commonly when they have liberty to choose, begin this operation the beginning of *May* after which by shallow ploughing, they have fine crops of barley, and half the usual seed is sufficient. Some sow wheat the first crop after burning, and sow late in *October* or *November*, and it often answers very well.

This practice of burning, should never be used upon rich soils, nor upon thin, or stony, gravelly, or chalky lands; upon heath and moss, and all deep sower lands it answers; but its fertility will not last longer to be worth plowing than three crops, and then commonly so poor as not to be recruited by dung for ten or twelve years after, and the burning ought not to be renewed for many years after the first paring; therefore if the land is to be kept for tillage or grass, it should

should be dunged by composts after the first crop, which will put it in the condition with other land for crops and dung afterwards. Expecting and taking too much from good managements is a common mistake, and very prejudicial to the farmer. Marle and moderate quantity, will answer the purpose of dung upon such lands.

Tho' rich soils should never be burnt, as ashes are good manure, and are almost of tenfold more use when burnt on the land, as thereby it hath the warmth of the fire besides the whole substance and effect of the ashes, it is practised with success in many countries, and remarkably in the island of *Ceylon* in the *East-Indies*, and constantly recommended by all antient authors, to bring brush and combustible stuff upon the land and burn it, with the straw or stubble. If hay and straw were more plenty which good husbandry would easily produce, a ranker stubble left upon the ground, would be a beneficial practice. In the said island of *Ceylon* and many other countries remarkable for uncommon fertility, they constantly burn the stubble of their harvest to prepare the ground for the subsequent crop; and in *America*, the natives spread dry wood upon their land for culture, and have rich crops from it. And many think this method much preferable in most cases to turffing, as less wasteful to the land, and equally effectual.

The practice even of savages, when grounded on reason, and supported by experience, is an example worthy of regard; tho' our want of such knowledge, is some imputation upon us, who are so apt to despise these people in most things: and, often unhappily think ourselves, much more knowing and wise.

In cold wet lands, there are sedge, and rushes which much obstruct any grass, and what grass is produced, is commonly short and sour, and not nourishing; all these are usually yellow and in a decayed state and somewhat dry in *October*, when by fire being set to a whole proper side of the field in a dry day with a moderate wind, they will burn. If after the first shower upon the few ashes produced, hay seeds are sown, the grass will be much improved in quantity and quality, at very small expence; and where the sward don't encourage burning as above, much being naked, potched, or spungy; if turffed as before directed, and hay seeds sown without corn or tillage, it will have the above effect. If there is planting, wood, or hedges adjoining, the plowing previously a ridge next them, will preserve from any hurt or danger, if care is taken to attend it, and the wind moderate. And where lime is to be had with ease, a sprinkling of it upon the ashes, is a further improvement, unless the land be a strong clay, when the lime would not be much service.

If in place of our manner of burning heather, which in the neighbourhood of woods and mosses have done much mischief, they would grub up the stuff upon such lands, with some of the earth, and burn them

them in small heaps, the effect would be much better, and mischief prevented; nay much of our wastes might be improved by this means for grass and corn. When heaps are wet by rain, they are to be spread in a calm day, and if for corn it is the better how soon they be plowed, but with a shallow furr. The great benefit of heating the land by burning any stuff upon it is evident from the observation of superior fertility from the spots where the heaps were burnt, compared with the rest, tho' all have equal ashes or manure of any sort.

I cannot, consistent with the good will I profess and truly have for my country, conclude this subject of manures, without mentioning again, and earnestly recommending, the practice of water being brought over the land, both by flooding and rilling, for both corn and grass. It is surprizing and unaccountable, how little this is practiced, when it is by much the cheapest manure and improvement of any, is equal to any; in its effect for corn or grass, will suit every soil, in almost every circumstance, if not allowed to ly too long improperly upon it, and may be used almost in every place, because even flat countries, and almost every field have their levels, and it can be conveyed by the help of the plow, many miles at small expence, and even where nothing else, small springs or rain water may be collected, and easily damed or penn'd up at proper places, both to flood such parts, by which the sediment subsides and nourishes, and it is thereby raised to heights to reach other grounds or parts, to which it could not otherways attain. It is also surprizing, that a people so wise and improved, as those in *England* and South parts of *Scotland*, should so little know or practise these things; likewise that a system of husbandry should be concluded, which the new system lately published and justly applauded is, without taking proper notice of this.

I shall now conclude, at least for this time, with one Observation, that as it hath pleased the Creator of the earth, to cover and store it with different soils and materials, of different textures and natures, some soils more rich and some more barren, but all capable of being improved, and means to correct almost every inconveniency to which any are liable, and to make a proper use of almost every material of which it consists; and he having also indued mankind the possessors and proprietors of the earth, with reason, which exerted with a suitable practice, enables him to mix and compound these soils usefully, and by various means some of which are suited to any circumstance or situation, to improve these soils and materials to his own great benefit; man himself is the only one to be blamed, if he is not prosperously and well accommodated with all he can reasonably wish for. And there is this further advantage from good husbandry, that the
most

most obscure person, and the most distant situation, can by his own practise and the influence which that may have upon others, be of real service to the community of which he is a member, at the same time he is improving his own fortune, nay perhaps of much more service than many stately dignified consumers; and there is not any thing can give a sociable person more pleasure, than to be of use to the society. And any suggestions which may in any degree contribute to the improvement of our crops of grain must be peculiarly seasonable, when corn is so dear in all parts of *Europe*, and the want of it, and consequential special distress upon the poor, which ought to be every benevolent man's peculiar attention, is much dreaded in most parts of *Britain* and *Ireland*.

E T N I S.